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NOAA-TM-NMFS-SWFC-107

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
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U.S. DEPARTMENT OF COMMERCE
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ABSTRACT

Hawaiian monk seal, Monachus schauinslandi, and green turtle, Chelonia mydas, research was conducted at Pearl and Hermes Reef in the Northwestern Hawaiian Islands, 3-9 June and 9-27 August 1986. Excluding pups, atoll counts of seals ranged from 37 to 54 ($\bar{x}$ = 45.2). Eighteen weaned pups were tagged. Two seals from Kure Atoll were sighted at Pearl and Hermes Reef in 1986. Twenty-three seal scats were collected. Twenty-three green turtles were tagged, and 15 green turtles previously tagged were resighted. Over 200 pieces of net and rope debris were sampled. No entanglements, injuries, or deaths were observed.

CONTENTS

INTRODUCTION

Pearl and Hermes Reef (lat. 27°55'N, long. 175°45'W) is a low coral atoll made up of four vegetated and three nonvegetated sandbar islands surrounded by a fringing reef in the Northwestern Hawaiian Islands (Fig. 1). It is one of eight recorded breeding, pupping, and haul-out sites for the endangered Hawaiian monk seal, Monachus schauinslandi, and also a foraging, basking, and nesting area for the threatened green turtle, Chelonia mydas. Recent research on the monk seal and green turtle at Pearl and Hermes Reef was initiated in 1982 by the National Marine Fisheries Service (NMFS), Southwest Fisheries Center (SWFC) Honolulu Laboratory and has continued yearly to the present (see Kam 1986; Gilmartin et al.;[1] Morrow et al.[2]). This research is being conducted to identify the factors contributing to the decline of the Hawaiian monk seal and to monitor the populations in the Northwestern Hawaiian Islands. Additional information on the history, geology, flora, and fauna of Pearl and Hermes Reef is available in Amerson et al. (1974). Our report describes the findings of the 1986 study.

METHODS AND MATERIALS

Censusing

Information on seals and turtles was gathered at Pearl and Hermes Reef on two separate trips in 1986 (Appendix A). The first field camp, based at Southeast Island, was from 3 to 9 June 1986, and most effort was directed at tagging weaned pups. On the second trip, 9-27 August 1986, two separate camps were set up, one on Southeast Island and the other at North Island. The main objectives of the August camp were 1) conduct seal and turtle censuses; 2) tag weaned pups; 3) resight seals tagged in previous years; 4) monitor injuries and deaths, and if any occur, attempt to determine their causes; 5) tag turtles; 6) collect seal scats and spews; and 7) collect net samples.

Beach counts of seals and turtles were conducted daily on all islands as weather permitted. An "atoll census" required all islands within the atoll to be counted within a 2-d period. The census form and instructions are presented in Appendix B. Criteria used for counting seals are given in

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[1]Gilmartin, W. G., C. E. Bowlby, and H. S. Stone. The Hawaiian monk seal on Pearl and Hermes Reef, 1982. Manuscr. in prep. Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, 2570 Dole Street, Honolulu, HI 96822-2396.

[2]Morrow, R. J., W. G. Gilmartin, and S. Conant. The Hawaiian monk seal on Pearl and Hermes Reef 1983, 1984, and 1985. Manuscr. in prep. Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, 2570 Dole Street, Honolulu, HI 96822-2396.

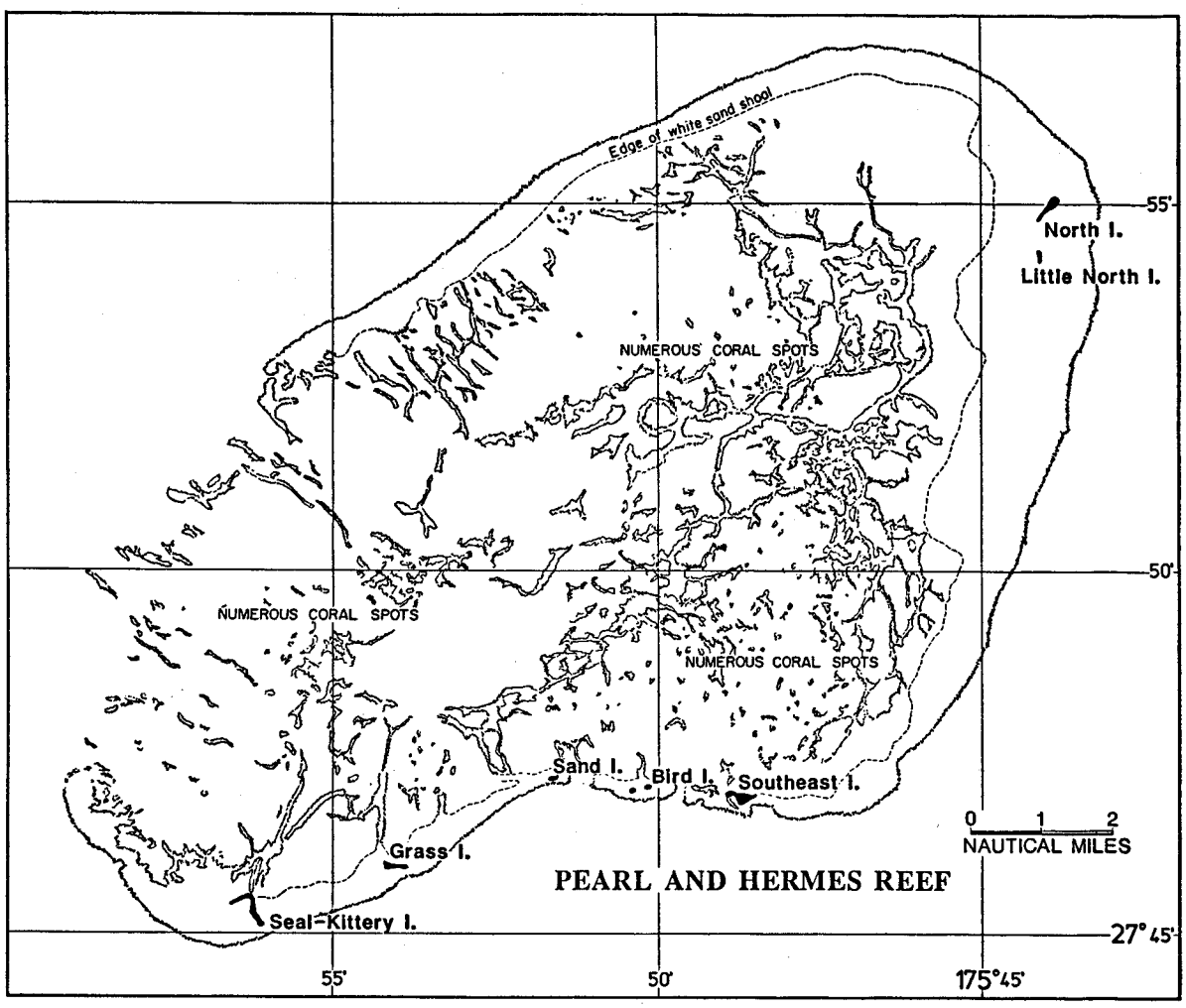

Figure 1.--Pearl and Hermes Reef, Northwestern Hawaiian Islands.

Johanos and Kam (1986). Sex and age classifications and the seal identification process are detailed in Stone (1984). On several windy days, rough seas prevented the census of the most southerly islands. As many individual islands as possible were censused when full atoll counts were not possible. All censuses were conducted between the hours of 1200 and 1930.

The censuses at the south end of the atoll began at Seal-Kittery Island, the farthest of the islands from Southeast Island, at approximately 1200, then were conducted at Grass, Sand, and Bird Islands and finally at Southeast Island. Censuses at the north end of the atoll began at Little North Island at approximately 1300 and then were conducted at North Island. The number of people censusing an island varied from one to two, depending on the size of the island and whether other activities were being conducted concurrently. Some of the smaller islands were censused from the boat to limit disturbance to the seals. Small sand islets at Bird and North Islands were included in censuses as sectors of those islands.

Tagging Weaned Pups

For tagging, weaned pups were approached while they were hauled out and relatively isolated from other seals. Usually one person restrained a pup while another punched a 5-mm-diameter hole through the webbing between the fourth and fifth digits on the hind flipper, using a leather punch tool (Gilmartin et al. 1986). A blue Temple Tag[3] was then inserted through the hole to where the connecting post of the two plates was in the punched hole. Both hind flippers were tagged in this manner. Standard length (straight line from tip of nose to tip of tail) and axillary girth (around the body, behind posterior origin of the foreflippers) measurements were taken, and duration of restraint time noted. Because of the limited time at Pearl and Hermes Reef, taggings were done opportunistically but not during the censuses.

Turtle Tagging and Resightings

Turtle tagging efforts were mainly directed at large turtles that hauled out on the beach to bask. A few turtles were caught from a boat by scoop nets, but high winds limited this work. Turtles were tagged with numbered and addressed Inconel alloy tags, size 681. These self-piercing and self-locking tags were placed on the trailing edge of the front flippers. The tagging pliers used were slightly modified to lessen damage to tissue around the tagging site (Balazs and Gilmartin 1985). Measurements of straight line carapace length (from the center of the precentral scute to the posterior tip of the postcentral scute) and straight line carapace width (from the sixth marginal scute) were taken when possible.

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[3]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

Collecting Scats and Marine Debris

Because of the paucity of information on seal prey at Pearl and Hermes Reef, all scats were collected. Processing of scats was accomplished by washing them through a series of three differently sized mesh strainers. Representative samples of any undigested material were then picked from the strainers. The date and island of collection, freshness (wet or dry) of the scat, and contents were recorded. No spews were seen.

All islands at Pearl and Hermes Reef were inventoried for net, line, loops, and other debris that might entangle seals and turtles. Samples of each were taken, and the following data were recorded: 1) island of origin, 2) location on island, 3) size, and 4) description, including type of material, mesh size, or rope diameter. The debris was then destroyed by burning.

RESULTS AND DISCUSSION

Seal Censusing

Six atoll counts were made in 1986 (Table 1). The total number of seals observed on an atoll count ranged from 45 to 61, ($\bar{x}$ = 54.2). Excluding pups of the year, the counts ranged from 37 to 54 ($\bar{x}$ = 45.2). A summary of 1986 census data by island, size class, and sex for each census is presented in Appendix C. There were no injuries or deaths of seals or turtles observed on Pearl and Hermes Reef while researchers were present in 1986.

Table 1.--Summary of atoll counts of Hawaiian monk seals by size class at Pearl and Hermes Reef, 1986 (M = male, F = female, and ? = unknown).

	Adult			Subadult			Juvenile			Pup			Total		
Date	M	F	?	M	F	?	M	F	?	M	F	?	Non-pup	Pup	Grand
8/10-11	8	8	12	5	7	3	3	6	2	2	4	1	54	7	61
8/12	2	8	15	9	4	5	3	3	2	5	3	0	51	8	59
8/13	7	9	6	8	2	5	3	4	1	5	4	1	45	10	55
8/15	4	2	13	5	2	0	2	7	4	4	5	1	39	10	49
8/16	5	7	9	5	1	2	6	1	1	2	4	2	37	8	45
8/17	8	7	7	6	2	8	4	3	0	3	6	2	45	11	56

Tagging Weaned Pups

A total of 18 pups were tagged at Pearl and Hermes Reef in 1986 (Appendix D). All pups observed were weaned by the time the second field camp arrived on 9 August, except one pup that weaned shortly before the August camp ended and was tagged on the last day the party was present.

Resightings

Tagging of weaned pups at Pearl and Hermes Reef began in 1983. During the 1986 surveys, high percentages of the pups tagged in previous years were sighted (i.e., 70% for 1983, 77% for 1984, and 80% for 1985) (Table 2). The short observation time at Pearl and Hermes Reef in 1986 may have precluded some tagged seals from being resighted. Therefore, these percentages should be taken as the minimum number of surviving pups.

Table 2.--Number of Hawaiian monk seal pups tagged at Pearl and Hermes Reef in 1983-86 and resighted through 1986[a] (M = male, F = female, and ? = unknown).

Year tagged	Pups tagged (No.)			Resightings (No.) by year					
				1984		1985		1986	
	M	F	?	M	F	M	F	M	F
1983	8	2	--	5	1	6	1	6	1
1984	5	8	--	--	--	4	8	4	6
1985	8	7	--	--	--	--	--	6	6
1986	10	7	1	--	--	--	--	--	--

[a]Data for 1983-85 taggings and resightings are from Morrow et al. (text footnote 2).

Interatoll Movement

Two seals from Kure Atoll, approximately 155 nmi to the northwest, were sighted at Pearl and Hermes Reef in 1986 (Table 3). The first, an adult female with bleach mark 843, was sighted at North Island on 5 June. This seal had been bleach marked the previous year at Kure Atoll and was last seen there on 22 October 1985. This seal was not observed in August but may have molted, thereby losing her identifying mark. The second immigrant, a subadult female, was born at Kure Atoll and tagged as a weaned pup at Sand Island on 18 July 1981. Last sighted at Shark Island, Kure Atoll, on 6 June 1986, this seal was sighted at Southeast Island, Pearl and Hermes Reef, on 23 August 1986. Both original tags (617 left and 618 right) were seen and read. A third tag (045) added to the left hind flipper on 2 July 1984 was only partially read. The seal had molted and appeared to be in good health, and a few small bite marks high on her back indicated she may have recently mated. Her postmolt size, however, caused her to be classified as a subadult.

Table 3.--Interatoll movement of Hawaiian monk seals to Pearl and Hermes Reef, 1986.

ID No.	Tag No.[a] L	Tag No.[a] R	Bleach No.	Size and sex[b]	Movement from Location	Movement from Last seen	Movement to Location	Movement to First seen
K039	--	--	843	A, F	Kure	10/22/85	Pearl and Hermes	6/5/86
K082	617	618[c]	--	S, F	Kure	6/6/86	Pearl and Hermes	8/23/86

[a]L = left hind flipper; R = right hind flipper.
[b]A = adult, S = subadult, and F = female.
[c]Tag color gray.

Green Turtles

Turtles were observed basking mainly on Southeast and North Islands. A summary of 1986 turtle census data by size and sex for each count is presented in Appendix E.

A total of 23 turtles were tagged at Pearl and Hermes Reef in 1986 (Appendix F). Twenty-one of these were tagged in one night at Southeast Island. The turtles at Pearl and Hermes Reef haul out in proximity to each other, making it difficult to approach individuals without disturbing other turtles in the same area. Tagging the turtles at night seemed to eliminate this problem. Also, the turtles seemed to respond more slowly to the tagger's presence at night, making it possible on many occasions to tag and measure the turtle before it reentered the water. The tagging was done on a night with a full moon, making visibility relatively good for the tagger.

Two turtles (one previously tagged) were caught by scoop net from a boat drifting over coral heads that small turtles use as feeding areas. Another small turtle was caught by scoop net from the boat in front of the Southeast Island camp. No tagging was done on North Island.

Fifteen previously tagged turtles were resighted at Pearl and Hermes Reef in 1986 (Appendix G). Most resightings were made at night for the same reason as stated above.

Materials Collected

A total of 23 seal scats were collected and processed. Samples consisted mainly of scales, bones, otoliths, teeth, and octopus beaks. Identification of monk seal prey species is ongoing and will be reported elsewhere.

Over 200 pieces of net and rope debris were inventoried in 1986. Samples of each item were taken, and the debris was then destroyed by burning. A detailed analysis of the debris collected will be reported elsewhere.

ACKNOWLEDGMENTS

We would like to acknowledge the support of the U.S. Fish and Wildlife Service (FWS) and the fishing vessel Feresa, who supplied transportation to Pearl and Hermes Reef for our June camp. We also thank the officers and crew of the NOAA ship Townsend Cromwell, who transported our field equipment and aided in our unloading and loading of the August camps. Thanks are also extended to the FWS personnel at French Frigate Shoals for monitoring our radio communications.

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APPENDIXES

Appendix A.--Itinerary for the 1986 Pearl and Hermes Reef field camps.

Date	Event
6/3	T. Gerrodette arrives at Southeast Island, Pearl and Hermes Reef, with U.S. Fish and Wildlife Service (FWS) personnel D. Hu, D. K. McDermond, and T. Ohashi on the fishing vessel Feresa.
6/9	Gerrodette departs Pearl and Hermes Reef with FWS on Feresa.
8/7	R. Forsyth and W. Gilmartin fly from Honolulu to Midway and meet D. Alcorn, who is arriving on NOAA ship Townsend Cromwell.
8/9	Depart Midway; arrive at Southeast Island on Townsend Cromwell. Field camp personnel Alcorn, Forsyth, Gilmartin, and University of Hawaii at Manoa personnel S. Conant and R. Fleischer.
8/11	Second camp is established at North Island.
8/24	North Island camp is disbanded.
8/27	Townsend Cromwell arrives, field camp is disbanded, and all personnel depart for Midway.
8/28	Arrive Midway; fly to Honolulu.

Appendix B.--Census/patrol instructions and census/patrol form.

1986 - CENSUS FORM DIRECTIONS

ISLAND - Name of island and atoll; e.g., East, FFS

OBSERVER - Three initials

TIME - On a 24-hour clock; e.g., 6 pm = 1800.

DATA TYPE - C = Census = a complete count on an island begun around 1300
A = Atoll-wide census (usually completed during one day)
P = Patrol = any other observation not on a timed census
Other letters may be used at your discretion to indicate specific kinds of noncensus data - e.g., M for male observations.

NUMBER - Censuses and patrols may be assigned numbers at your discretion.

PAGE - If census (or patrol) requires three pages, then mark first page as "Page 1 of 3," etc. If two people census with separate sheets then combine page numbers; person A has pages 1 and 2, while person B has pages 3 and 4 of a 4-page census day.

TEMP. - Temperature in degrees Celsius at beginning of census/patrol.

WIND - Speed: 0 = no wind, calm (<5 knots)
1 = light breeze (5-15 knots)
2 = strong wind (>15 knots)
Direction: NW, NN, NE, EE, SW, SS, SE, WW
Thus, [2][N][N] = strong wind from north

CLOUD - Cloud cover: 00 = no clouds
01-09 = 10 to 90% cover
10 = 100% cover

PREC. - 0 = no precipitation
1 = mist/drizzle
2 = rain
3 = intermittent rain

SECTOR - Location on island (e.g., 1-49 on Lisianski; 99 = no island)

SIZE - P1 = nursing pup, wrinkles
P2 = nursing pup, no wrinkles
P3 = nursing pup, blimp, black
P4 = nursing pup, molting
P5 = nursing pup, molted
} P = nursing pup

PW = prematurely weaned (undersized) pup
W = weaned pup

J1 = juvenile I
J2 = juvenile II
S3 = subadult III
S4 = subadult IV

J = juvenile
S = subadult

I = immature

A = adult
T1 = turtle, juvenile (<65 cm)
T2 = turtle, subadult (65-80 cm)
T3 = turtle, adult (>80 cm)

T = turtle

U = seal of unknown size

SEX - M = male
F = female
U = unknown

ID - Record ID # of seal if known, right justified:
e.g., seal #25 = _25
? column: ✓ or 1 = ID # is questionable
0 = seal is definitely not an IDed animal

BLEACH - Bleach # of seal if known, right justified; these columns may also be used for any temporary numbers assigned in the field
? column: ✓ or 1 = bleach is present, but the # is questionable
0 = seal is definitely unmarked

TAG - Tag number if known, right justified: tag #K23 = _K23
L/R: tag position - L = tag on left flipper
R = tag on right flipper
B = tags on both flippers
(only one tag # need be entered)
COL: color code - G = green (Lisi) T = tan (Laysan)
K = gray (Kure) R = red (Midway, Necker, Nihoa)
B = blue (P&H) Y = yellow (FFS)
M = metal
? column: ✓ or 1 = seal is tagged, but the # is questionable
0 = seal is definitely not tagged

BEACH POS. - Location of seal or turtle when observer comes abreast of animal (i.e., seal may be seen midbeach from a distance and yet be at waterline when observer comes abreast; seal would be recorded as at waterline).

0 = animal in water or on an offshore rock (not included in census tally but may be used for behavioral data)
1 = along waterline, on wet sand
2 = midbeach, on dry sand
3 = vegetation zone or beach crest, on permanent beach

MOLT - Percentage of old pelage lost, optional for nursing pups
blank or 0 = no molting evident
__1-_99 = 1% to 99% molted (right justified)
100 = 100% molted, freshly molted
? column: ✓ or 1 = seal is molting, but % molt is questionable

DISTURB - The degree to which the seal may have been disturbed by observer:
blank or 0 = no disturbance, or seal merely looked at observer
1 = seal vocalized, gestured, or moved ≤ two body lengths
2 = seal alerted to observer and moved > two body lengths
3 = seal alerted to observer and fled into water

TIME - The time of an observation, on a 24-hour clock

Association data - There's room to describe 2 different associations (A & B).
Active associations
1) Noted for all except behaviors between mother and nursing pup
2) Must take place within 30 m of observer
3) Subjects may be any distance apart
Spatial associations
1) Noted as observer comes abreast of the subject
2) "Entangleable" object: distances <2 m away
3) Individual seals and turtles
- Mother-pup pair (N): any distance
- All others (L): distances ≤10 m away, record 2 nearest neighbors in straight line of sight
- Record seal-seal and turtle-seal but not turtle-turtle associations.

LINE NO. - Identity of the other party in the association
1) If a seal or turtle, put its line No. here
(note line No. refers to within same census page only)
2) If an "entangleable" object, put
NR or 99 = net and/or rope
FL or 98 = flotsam other than above

DIST. - Closest distance during behavior
0 = body contact
1 = <2 m
2 = 2-5 m
3 = >5 m (>5 m but ≤10 m in the case of L behavior code)

BEHAVIOR - Up to 4 behaviors may be recorded for each association, but N, E, X and 0 should not appear together with other behaviors
1) Individual seal or turtle
a) Active behavior
A = approach/investigate/sniff/nudge

B1 = bite, nip
B2 = bite, draws blood/breaks skin
} B = bite

Additional notes:

1. All associations (except with "entangleable" objects) should be in pairs, that is, between animals on two different lines. If the behavior is active, you should fill in the line numbers, distances, and behavior codes for both animals involved in the association. If the behavior is N or L, however, you may record the association on only one of the lines, leaving it to the computer to fill in the other line.

2. An association should either be all blank or have the 0 or X behavior only, with no line number or distance, or have a line number, a distance, and some behavior code (other than 0 or X) all present.

3. On a census it is assumed that molt, disturbance, and behavioral data will be taken. Thus on a census data sheet, no code in any of the A or B columns means that the seal was alone, while on a patrol data sheet, this may simply mean that no data were taken. It is not necessary to put an "0" code for each unassociated animal on census. The computer will fill this in later. If you are unable to record association data on a census for any reason, indicate this with an X for the behavior code.

4. Weather information (except temperature) should be a summary of the entire day up until the end of the census, not merely an instantaneous observation.

5. A separate census sheet should be filled out for each island within an atoll. If no seals are present, you should still fill out the information at the top of the census form and write "No seals" in the data area. If the island itself is not present, indicate this by using 99 for the sector code, leaving the rest of the (first) line blank.

Seal Census Form

PAGE _____ OF _____

ISLAND _____ OBSERVER ☐☐☐ TIME BEGIN ☐☐☐☐ END ☐☐☐☐

DATE _____ DATA TYPE ____ TEMP. ☐☐ WIND ☐☐☐

NUMBER _____ CLOUD ☐☐ PREC. ☐

LINE NO.	SECTOR	SIZE	SEX	ID NO.	ID ?	BLEACH	BLEACH ?	TAG NO.	TAG L/R	TAG COL	TAG ?	BEACH POS	MOLT %	MOLT ?	DISTURB	TIME	A LINE NO.	A DIST.	A BEHAVIOR	B LINE NO.	B DIST.	B BEHAVIOR	CONTINUE	NOTES
1																								
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								
11																								
12																								
13																								
14																								
15																								
16																								
17																								

NOTES: _____

LINE NO.	SECTOR	SIZE	SEX	ID NO.	ID ?	BLEACH	BLEACH ?	TAG NO.	TAG L/R	TAG COL	TAG ?	BEACH POS.	MOLT %	MOLT ?	DISTURB	TIME	A LINE NO.	A DIST.	A BEHAVIOR	B LINE NO.	B DIST.	B BEHAVIOR	CONTINUE	NOTES
18																								
19																								
20																								
21																								
22																								
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36																								

NOTES:

Appendix C.--Summary of census counts of Hawaiian monk seals by size class and island at Pearl and Hermes Reef, 1986 (M = male, F = female, and ? = unknown).

Date	Adult			Subadult			Juvenile			Pup			Total		
	M	F	?	M	F	?	M	F	?	M	F	?	Non-pup	Pup	Grand
North Island															
8/11	1	1	1	0	0	2	0	1	1	1	1	0	7	2	9
8/12	1	4	2	1	2	1	1	0	0	4	0	0	12	4	16
8/13	0	4	0	0	0	2	0	0	0	3	2	0	6	5	11
8/14	0	2	5	0	0	0	4	2	2	3	1	2	15	6	21
8/15	0	2	1	2	0	0	1	3	3	3	3	1	12	7	19
8/16	0	2	3	1	0	0	1	0	1	1	2	0	8	3	11
8/17	2	2	1	3	0	2	1	0	0	1	2	1	11	4	15
8/18	1	1	4	2	0	3	1	0	1	1	2	1	13	4	17
8/19	0	4	1	0	0	1	1	0	0	2	1	2	7	5	12
Little North Island															
8/11	1	2	2	1	1	1	0	1	1	0	0	0	10	0	10
8/12	0	2	2	3	2	0	0	0	0	1	0	0	9	1	10
8/13	2	3	0	2	1	2	2	1	1	1	0	1	14	2	16
8/14	1	1	0	1	1	1	2	1	1	1	0	0	9	1	10
8/15	0	0	1	0	0	0	1	0	0	1	0	0	2	1	3
8/16	1	3	0	1	0	0	2	0	0	0	0	1	7	1	8
8/17	0	1	3	0	0	1	1	0	0	1	1	0	6	2	8
8/18	0	0	0	0	0	2	1	0	0	0	0	4	3	4	7
8/19	0	0	0	0	1	1	0	0	0	0	0	1	2	1	3
Southeast Island															
8/10	1	1	3	0	1	0	0	1	0	1	0	0	7	1	8
8/12	0	1	6	0	0	0	0	1	1	0	0	0	9	0	9
8/13	3	1	3	1	0	1	0	2	0	1	0	0	11	1	12
8/15	3	0	3	1	0	0	0	1	0	0	0	0	8	0	8
8/16	1	0	4	0	0	1	1	1	0	1	0	0	8	1	9
8/17	2	2	0	0	1	3	2	0	0	1	0	0	10	1	11
8/18	2	3	3	0	0	1	0	1	2	2	0	0	12	2	14
8/19	3	0	3	0	1	1	1	0	0	0	0	0	9	0	9
8/20	0	0	1	1	1	2	0	0	0	1	0	0	5	1	6
8/21	1	2	3	1	1	0	1	0	1	1	0	0	10	1	11
8/22	3	4	6	3	1	2	1	1	1	1	0	0	22	1	23
8/23	0	1	4	2	2	2	0	0	1	2	0	0	12	2	14
8/24	0	2	1	3	1	1	2	1	0	2	0	0	11	2	13
8/25	3	1	1	2	3	1	1	0	1	2	0	0	13	2	15

Appendix C.--Continued.

Date	Adult			Subadult			Juvenile			Pup			Total		
	M	F	?	M	F	?	M	F	?	M	F	?	Non-pup	Pup	Grand
Seal-Kittery Island															
8/10	4	1	5	2	2	0	1	1	0	0	2	0	16	2	18
8/12	0	1	4	2	0	4	1	0	0	0	2	0	12	2	14
8/13	1	1	2	2	0	0	1	0	0	0	1	0	7	1	8
8/15	1	0	5	0	0	0	0	1	1	0	1	0	8	1	9
8/16	2	2	1	1	0	1	2	0	0	0	1	1	9	2	11
8/17	2	1	2	1	0	0	0	1	0	0	3	0	7	3	10
8/20	1	4	1	4	0	0	1	1	0	0	2	0	12	2	14
8/25	3	1	2	1	0	1	1	2	0	0	1	0	11	1	12
Grass Island															
8/10	1	1	1	2	2	0	2	0	0	0	1	1	9	2	11
8/12	1	0	1	1	0	0	1	0	0	0	1	0	4	1	5
8/13	1	0	1	2	1	0	0	0	0	0	1	0	5	1	6
8/15	0	0	3	1	2	0	0	0	0	0	1	0	6	1	7
8/16	1	0	1	2	0	0	0	0	0	0	1	0	4	1	5
8/17	2	1	0	1	1	0	0	1	0	0	0	1	6	1	7
8/20	1	2	1	1	1	0	0	0	0	0	1	1	6	2	8
8/25	2	3	1	0	1	0	0	1	0	0	0	0	8	0	8
Sand Island															
8/10	0	2	0	0	0	0	0	0	0	0	0	0	2	0	2
8/12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/17	0	0	1	0	0	1	0	0	0	0	0	0	2	0	2
8/20	1	0	0	0	1	0	0	0	0	0	0	0	2	0	2
8/25	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1
Bird Island															
8/10	0	0	0	0	1	0	0	2	0	0	0	0	3	0	3
8/12	0	0	0	2	0	0	0	2	1	0	0	0	5	0	5
8/13	0	0	0	1	0	0	0	1	0	0	0	0	2	0	2
8/15	0	0	0	1	0	0	0	2	0	0	0	0	3	0	3
8/16	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1
8/17	0	0	0	1	0	1	0	1	0	0	0	0	3	0	3
8/20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8/25	0	0	1	0	1	0	0	0	0	0	0	0	2	0	2

Appendix D.--Summary of Hawaiian monk seal pups tagged at Pearl and Hermes, 1986.

ID No.	Tag No.[a] L	Tag No.[a] R	Sex[c]	Date tagged	Measurement (cm) at tagging[b] AG	Measurement (cm) at tagging[b] SL	Island	Restraint time (min:sec)
BL00	L00	L01	M	6/4	--	--	North	3:00
BL02	L02	L03	M	6/4	--	--	Little North	4:00
BL04	L04	L05	F	6/4	--	--	North	4:00
BL06	L06	L07	M	6/5	--	--	North	2:30
BL08	L08	L09	M	6/5	--	--	North	1:30
BL10	L10	L11	M	6/5	--	--	North	2:30
BL12	L12	L13	F	6/8	--	--	Grass	--
BL14	L14	L15	F	6/8	--	--	Grass	--
BL16	L16	L17	F	6/8	--	--	Seal-Kittery	--
BL18	L18	L19	M	6/9	--	--	Seal-Kittery	5:00
BL21	L21	L20	M	8/11	105	139	North	5:11
BL24	L24	L22	M	8/13	115	140	North	5:40
BL23	L23	L25	?	8/14	105	135	North	2:54
BL27	L27	L26	F	8/14	110	137	North	2:23
BL28	L28	L29	M	8/14	115	137	North	3:30
BL31	L31	L30	M	8/13	108	135	Southeast	3:00
BL32	L32	L33	F	8/19	110	149	North	4:27
BL34[d]	L34	L35	F	8/27	109	125	North	3:00

[a] L = left hind flipper; R = right hind flipper.

[b] AG = axillary girth measurement around the body, behind posterior origin of the fore-flippers; SL = straight line measurement from tip of nose to tip of tail.

[c] M = male, F = female, and ? = unknown.

[d] Mother ID BH37.

Appendix E.--Number of Hawaiian green turtles basking at Southeast Island and North Island, Pearl and Hermes Reef, in August 1986.

Day	Immature (sex unknown)	Adult			Total
		Female	Male	Sex unknown	
10[a]	1	6	6	3	16
11[b]	8	2	6	5	21
12	11	4	2	7	24
13	13	2	11	7	33
14[b]	7	3	1	--	11
15	10	2	3	1	16
16	11	5	7	5	28
17	9	3	4	3	19
18	6	1	4	2	13
19	3	3	--	--	6
20[a]	4	2	5	1	12
21[a]	2	2	3	2	9
23[a]	--	--	2	2	4
24[a]	4	1	3	3	11
25[a]	2	--	2	--	4

[a]Southeast Island only.
[b]North Island only.

Appendix F.--Green turtles tagged at Pearl and Hermes Reef, 1986.

Tag No.[a]					Location			Straight carapace measurement (cm)	
L	R	Size[b]	Sex[c]	Date tagged	Island[d]	Sector	Status	Length	Width
8961	--	A	M	8/23	SE	5	Basking	>95	--
--	8966	A	M	8/23	SE	5	Basking	81.6	--
8971	--	A	M	8/23	SE	5	Basking	--	--
8975	--	A	M	8/23	SE	5	Basking	85.7	--
8959	--	A	F	8/23	SE	5	Basking	--	--
8960	--	A	F	8/23	SE	5	Basking	--	--
8964	--	A	F	8/23	SE	5	Basking	82.7	--
--	8965	A	F	8/23	SE	5	Basking	87.5	--
8970	--	A	F	8/23	SE	5	Basking	83.1	--
8973	--	A	F	8/23	SE	5	Basking	--	--
--	8954	I	?	8/23	SE	5	Basking	70.5	--
--	8955	I	?	8/23	SE	5	Basking	62.2	--
8956	--	I	?	8/23	SE	5	Basking	--	--
--	8957	I	?	8/23	SE	5	Basking	80.9	--
--	8958	I	?	8/23	SE	5	Basking	65.3	--
8963	--	I	?	8/23	SE	5	Basking	72.0	--
--	8967	I	?	8/23	SE	5	Basking	65.0	--
--	8968	I	?	8/23	SE	5	Basking	--	--
--	8969	I	?	8/23	SE	5	Basking	81.5	--
--	8972	I	?	8/23	SE	5	Basking	--	--
8974	--	I	?	8/23	SE	5	Basking	77.0	--
8977	8976	I	?	8/24	SE	5	Swimming	43.0	35.0
8979	8978	I	?	8/26	IPR	--	Foraging	32.3	33.0

[a] L = left front flipper; R = right front flipper.
[b] A = adult; I = immature.
[c] M = male, F = female, and ? = unknown.
[d] SE = Southeast Island; IPR = Interior Patch Reef.

Appendix G.--Resightings of tagged Hawaiian green turtles at Pearl and Hermes Reef in 1986.

Tag No.[a]		Size[c]	Sex[d]	Date		Location[b]		Status	Straight carapace measurement (cm)	
L	R			Resighted	Tagged	Resighted	Tagged		Length	Width
7021	7022	A	M	8/23	6/1/83	SE	SE	Basking	80.9	--
--	5555	A	M	8/23	8/8/81	SE	SE	Basking	87.6	--
2971	937	A	M	8/23	12/14/70	SE	SE	Basking	82.1	--
--	6995	A	M	8/23	5/19/83	SE	SE	Basking	87.8	--
--	6952	A	M	8/23	4/28/83	SE	NI	Basking	88.8	--
--	5553	A	F	8/18	8/8/81	SE	SE	Basking	--	--
--	5581	A	F	8/23	12/14/70	SE	SE	Basking	88.7	--
--	5579	A	F	8/18	8/9/81	NI	NI	Basking	--	--
6953	--	A	?	8/23	4/30/83	SE	SE	Basking	83.3	--
6969[e]	--	I	--	8/18	5/5/83	NI	NI	Basking	--	--
6963	--	I	--	8/18	5/2/83	NI	NI	Basking	--	--
8963	--	I	--	8/24	8/23/86	SE	SE	Basking	72.0	--
--	7381	I	--	8/23	4/30/83	SE	SE	Basking	79.0	--
--	5859	I	--	8/21	7/2/82	SE	SE	Basking	--	--
8284	8283	I	--	8/26	7/13/84	IPR	IPR	Foraging	41.5	31.8

[a] L = left front flipper; R = right front flipper.
[b] SE = Southeast Island, NI = North Island, and IPR = Interior Patch Reef.
[c] A = adult; I = immature.
[d] M = male, F = female, and ? = sex unknown.
[e] And also left tag No. 8266.

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